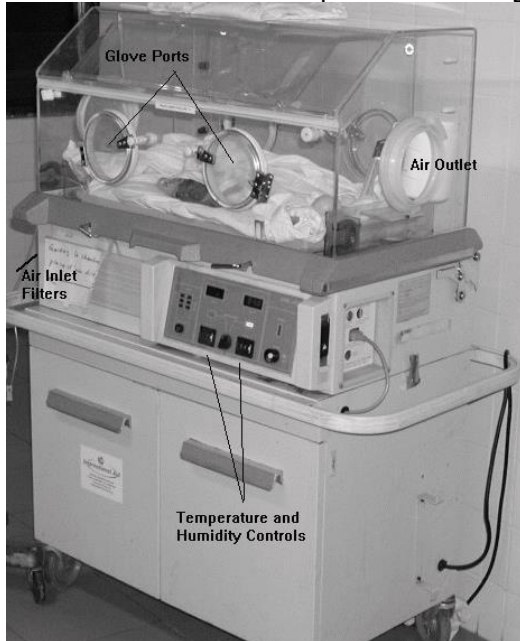


2.10 Infant Incubator

2.10.1 Clinical Use and Principles of Operation

A baby incubator is an isolation chamber that helps regulate the temperature of an infant and can provide air which is enriched in humidity or oxygen. The basic machine has a place for the baby to lie and is surrounded by a clear plastic box. A heating element lies below the baby. There is always a control for the heater, and generally a feedback mechanism to regulate temperature within a degree of a set point. Most incubators in the developing world have latex gloves built into the chamber that allow for manipulation of the baby without entering the isolated environment (see figure).

An infant incubator provides a warm, moist and sometimes sterile environment for a newborn. In the developing world, as shown in this incubator in Togo, the ports are left open and the filters are missing, leaving the environment warm and moist, but not sterile. The infant sits on a platform covering a water holding tank and fans.



In some older units the temperature is controlled by a rheostat and must be manually adjusted as conditions change. The temperature is displayed via panel displays, digitally in newer units, with an analog meter in older units and with a thermometer in the oldest units. Most units have a small fan to move the air past the heater and into the infant chamber. All but the oldest of the units will have alarm settings for over and under temperatures in the incubator. There also is a default high temperature cutoff that prevents the incubator from heating above 40 degrees C.

In some units there is a reservoir of water that the air moves over to increase the humidity in the infant chamber. This is often supplemented by other sources of humidity. To reduce the water loss of an infant in an incubator literature suggests that the relative humidity in the incubator be between 60 and 90%.

All the access doors should have positive latches on them so that they stay closed. The hoods will have one or more cable/tubing entry ports that allow for monitoring cables, IV lines, suction tubing, etc. to enter the infant chamber without going through an access door.

2.10.2 Common Problems

If the chamber is not heating, it may be the heating element. The heating element is typically a special (nicrome) wire. The wire cannot be repaired, typically, but it is common and a replacement can often be found in a large city. The only requirements for replacing the heating element with a new one are that the power and resistance of the new element be equal to the old.

Particles can build up inside the humidification chamber. The humidification chamber should be rinsed out and dried after every use. If necessary, it is acceptable to use diluted bleach to cleanse the chamber.

If the heater control is a rheostat the knob should be checked to make sure that it is not loose and turning on the shaft. The markings on the control are only approximate. A dead spot in the rheostat may cause it to change the temperature drastically with only a small change in position. Try cleaning the dust out of the rheostat. If that does not work, the rheostat will have to be replaced.

If the air flow has dropped, check the fan filter. The frequency of replacement depends on the environment and usage. The fan also assists in the removal of carbon dioxide from the chamber, which should be kept below 500 ppm.

If the temperature is not maintained in the chamber, there may be a large leak or opening. Check the seals around the doors. Also check for an external heat source, sunlight or phototherapy (bili) lights. They can affect the warming characteristics of the incubator.

If the fan is getting noisy, try lubricating the motor or tightening any loose bolts. If the fan is noisy, it can affect the long term hearing of the infant. The path for the movement of air must be kept clear to assure that the temperature is stable and even across the infant in all positions.

In some units there is an inner wall in the infant chamber that directs the flow of the heated air around the infant. These inner walls are held in place with plastic standoff posts and may loosen up with use. These should be inspected to assure that they are properly fastened in place.

2.10.3 Suggested Minimal Testing

When deciding whether to release an infant incubator back to the floor, the temperature should function between 34 and 40 degrees Celsius and should be accurate to within 0.5 degrees at all possible settings. Be sure the temperature cannot exceed 40 degrees Celsius.

The fan should not be excessively noisy (below 65 db). Assuming you don't have a sound meter with you, try to estimate the noise of the fan with your own ear placed where the baby's will be. It should be so quiet that you could comfortably hear all the conversations in the room around you.

The humidifier chamber should be clean and dry when returned.